

Chapter I – Introduction

Energy efficiency is a high priority resource for Utah. Governor Jon Huntsman announced on April 26, 2006 a goal of increasing energy efficiency in the state of Utah 20 percent by 2015. This goal was officially established in Executive Order 2006-0004, issued by Governor Huntsman on May 30, 2006.² The goal applies to all forms of energy use in the state, including electricity, natural gas, gasoline, and other petroleum products. It is intended to make Utah one of the nation's most energy-efficient states, thereby lowering energy bills paid by consumers, enhancing energy security and reliability, improving business profitability and competitiveness, and reducing air pollutants and greenhouse gas emissions.³

Following the announcement of the goal, an ad hoc group of state officials and other interested parties began to work on the metrics for measuring progress towards achieving the goal. The Working Group reviewed the status of energy efficiency efforts in Utah and made recommendations for further initiatives to advance energy efficiency in the state. Moreover, inspired by the leadership of Governor Huntsman, energy efficiency has received strong support over the past year within the Governor's Office, state government more broadly, and from the major electric and gas utilities operating in Utah.

In order to help the state examine options for achieving the energy efficiency goal, the Governor's Office invited the Southwest Energy Efficiency Project (SWEET) and Utah Clean Energy (UCE) to prepare a state energy efficiency strategy. The primary objectives of the strategy are to explore what could be done to achieve the Governor's goal, examine the feasibility of achieving the goal for different types of energy, and estimate what the economic and environmental impacts of achieving (or approaching) the goal would be.

The Utah Energy Efficiency Strategy contains 23 major policies, programs, or initiatives that could be implemented in order to accelerate energy efficiency improvements in the state and achieve the goal where possible. The policies will save electricity, natural gas, motor vehicle fuels, and other petroleum products. These energy sources represent a large majority of overall energy use in the state (excluding energy used as an industrial feedstock). However, we do not consider options for increasing the efficiency of a few forms of energy, including jet fuel, liquefied petroleum gas (LPG), or coal used directly by industry.

For each option in the strategy, we first provide a background discussion that discusses precedents for the policy in both Utah and in other states. Then we describe the specific policy proposal, estimate the energy savings that would result by 2015 and 2020 from implementing the policy, analyze cost and cost effectiveness, estimate reductions in

² Governor's Executive Order 2006-0004: Improving Energy Efficiency. www.rules.utah.gov/execdoks/2006/ExecDoc113478.htm

³ *Energy Efficiency: Utah's High-Priority Resource*. EPA 430-F-07-003. U.S. Environmental Protection Agency, Clean Energy-Environment State Partnership Program. 2007.

criteria pollutant and carbon dioxide emissions, review other environmental and social impacts, and discuss political feasibility. In addition, we include our recommended priority (high, medium, or low) for each option.

Current Energy Use

Before considering options for increasing energy efficiency, it is helpful to review how energy is currently used in Utah. The State Energy Program has compiled energy consumption information for 2005 based on data collected by the Energy Information Administration of the U.S. Department of Energy. Figure 1 shows the breakdown of primary energy consumption by energy type. In this evaluation electricity is considered in terms of fuel input for electricity production (source Btus). Consequently, consumption of coal, natural gas, and other fuels excludes energy used for electricity generation. On this basis electricity accounts for over 44 percent, all petroleum products 34 percent, and natural gas 19 percent of total primary energy consumption. This figure includes fuel feedstocks, fuels used to produce electricity that then is exported, as well as true in-state energy consumption. With respect to electricity production, coal-fired power plants account for over 95 percent of electricity generation in the state.

Figure 1 – Utah Primary Energy Use in 2005

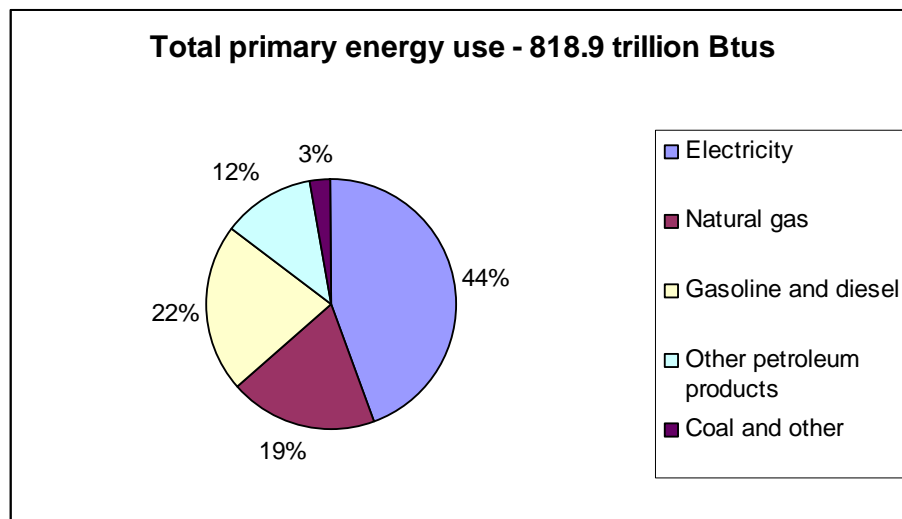
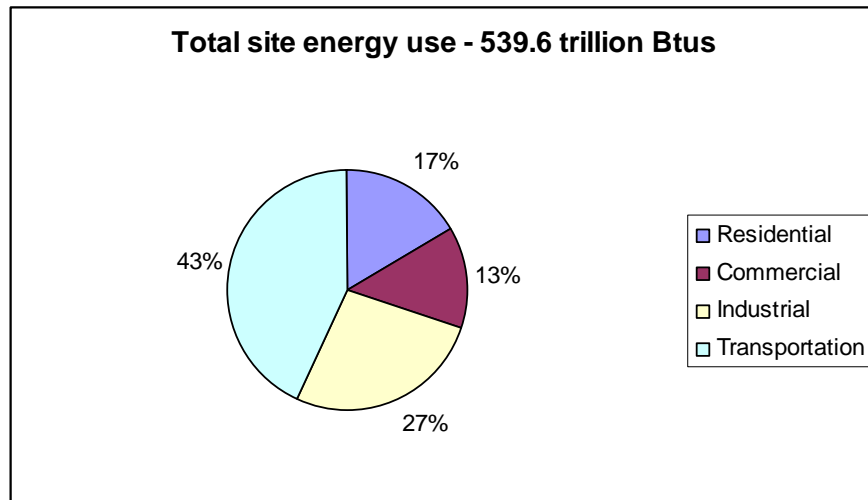


Figure 2 shows secondary energy consumption by sector. In this case, electricity is counted in terms of its direct energy content (site Btus). On this basis the transportation sector is most significant, followed by the industrial, residential, and commercial sectors. The main energy sources of concern in this study—electricity, natural gas, gasoline, and diesel fuel—account for 85 percent of total energy consumption in the state on a primary basis and 76 percent of total energy consumption on a secondary (site) basis.

Figure 2 – Utah Site Energy Use in 2005



Methodology

The methodology begins with our definition of a 20 percent improvement in energy efficiency by 2015. An increase in energy efficiency of 20 percent by 2015 is equivalent to a 16.7 percent ($1 - 1/1.20$) reduction in projected baseline energy use that year. A 20 percent increase in energy efficiency does not translate to a 20 percent reduction in energy use, in the same manner that a 100 increase in energy efficiency does not translate to a 100 percent reduction in energy use (a doubling of energy efficiency represents a 50 percent reduction in energy use).

The baseline scenario is a projection of energy use in the future given expected population and economic growth, but without new energy efficiency measures and initiatives taken into account. Our baseline assumptions, derived from utility forecasts and other sources, include growth in electricity consumption of 3.2 percent per year, growth in natural gas consumption of 1.5 percent per year, and growth in gasoline and diesel consumption (combined) of 2.0 percent per year during 2006-2020.

We then examine the potential of each option in the strategy, and the combination of options, to reduce this baseline energy demand projection. Energy efficiency programs or initiatives begun in 2006 are included in our policy scenario since this is the year the Governor announced the energy efficiency goal. As will be shown in the strategy, our policies reduce the otherwise anticipated growth in energy demand in Utah significantly. However, they do not result in an absolute reduction in energy use from current levels, except in the case of natural gas.

We include the effects of current policies and programs, (e.g. utility demand-side management programs and building energy codes), in estimating energy savings potential in order to give credit for ongoing energy efficiency initiatives. In particular we count savings from efficiency measures installed in 2006 and thereafter since the Governor

adopted the efficiency goal that year. We also project energy use in the baseline scenario and the energy savings from each of our options through 2020. In some cases, the energy savings are moderate by 2015 but increase significantly between 2015 and 2020.

We have taken steps to avoid double counting of energy savings among the various options. This is done by reducing the savings potential attributed to certain options that are examined after other overlapping options have been assessed; e.g., we reduce the savings associated with building energy codes and education and training options due to their overlapping with utility demand-side management (DSM) options. In some cases, such as in the transportation area, adjustments are made when summing energy savings in order to avoid double counting and overstating overall energy savings potential.

For the economic analysis, all values are presented in 2006 dollars with costs and benefits after 2006 discounted using a five percent annual discount rate. Energy prices are assumed to remain constant at their levels in 2006, other than increasing with inflation; i.e., energy prices are assumed to remain constant in real dollars. This is a conservative assumption given that energy prices are rising due to increasing fuel costs, increasing construction costs, and tightening environmental standards. Also, net economic benefits are considered over the lifetime of energy efficiency measures installed during 2006-2015; i.e., we include the full energy savings of measures installed in the latter part of this time period but with discounting of future savings.

For the environmental impacts analysis, we use the average emissions rates of “avoided” new fossil fuel power plants in the Rocky Mountain region in response to stepped-up energy efficiency efforts. These rates were calculated in another study that made use of the Energy Information Administration’s National Energy Modeling System (NEMS) model to determine future power plant emissions in reference and high efficiency scenarios. The difference in emissions, based on avoiding a mix of new coal-fired and natural gas-fired power plants, provides average emissions rates for “avoided” new power plant capacity in the region.⁴ The specific emissions coefficients we use are: 671 metric tons of CO₂ per GWh saved, 0.045 short tons of SO₂ per GWh saved, 0.28 short tons of NO_x per GWh saved, and 0.004 pounds of mercury per GWh saved. The emissions coefficients for SO₂ and NO_x are relatively low due to the stringent emissions standards on new power plants. Emissions coefficients for natural gas and petroleum products are based on their direct energy content; i.e., the CO₂ emitted when these fuels are burned.

Water savings from decreased operation of power plants is based on the average water consumption rates of new coal-fired and natural gas-fired power plants, as estimated in the previously-referenced study. Assuming an equal amount of avoided operation of each type of power plant and conventional wet cooling systems, this value is 0.5 gallons of water savings per kWh of avoided electricity generation.

⁴ *The New Mother Lode: The Potential for More Efficient Electricity Use in the Southwest*. Boulder, CO: Southwest Energy Efficiency Project, Nov. 2002. <http://www.swenergy.org/nml/index.html>